

SECTION 02520 - PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Extent of portland cement concrete paving is shown on drawings, including curbs, gutters, walkways, and pavement.
- B. Prepared subbase is specified in "Earthwork" section.
- C. Concrete and related materials are specified in Division 3.
- D. Joint fillers and sealers are specified in Division 7.

1.3 SUBMITTALS

- A. Provide samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for concrete and joint fillers and sealers.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified and the Federal Highway Administration "Standard Specifications For Construction of Roads and Bridges on Federal Highway Projects".



1.5 JOB CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
 - 1. Coordinate with requirements for "Temporary Facilities" specified in Division 1.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
 - 1. Use flexible spring steel forms or laminated boards to form radius bends as required.
- B. Coat forms with a nonstaining form release agent that will not discolor or deface surface of concrete.
- C. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185.
 - 1. Furnish in flat sheets, not rolls, unless otherwise acceptable to the Contracting Officer's Representative.
- D. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
- E. Fabricated Bar Mats: Welded or clip-assembled steel bar or rod mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars, unless otherwise indicated.
- F. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.



- G. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- H. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- I. Expansion Joint Materials: Comply with requirements of applicable Division 7 sections for preformed expansion joint fillers and sealers.
- J. Antispalling Compound: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.
- K. Liquid-Membrane Forming and Sealing Curing Compound: Comply with ASTM C 309, Type I, Class A unless other type acceptable to Contract Officer. Moisture loss no more than 0.055 gr./sq. cm. when applied at 5 sq. m/liter (200 sq. ft./gal).
- L. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.
- M. Epoxy Adhesive: ASTM C 881, 2-component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.

2.2 CONCRETE MIX, DESIGN, AND TESTING

- A. Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control and as herein specified.



- B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:
 - 1. Compressive Strength: 25 Mpa (3000 psi), minimum at 28 days, unless otherwise indicated.
 - 2. Slump Limits: 200mm (8 inches) minimum for concrete containing high-range water-reducing admixture (superplasticizer); 75mm (3 inches) for other concrete.
 - 3. Air Content: 5 to 8 percent.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.2 FORM CONSTRUCTION

- A. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork for grade and alignment to following tolerances:
 - 1. Top of forms not more than 3mm in 1 meter (1/8 inch in 10 feet).
 - 2. Vertical face on longitudinal axis, not more than 6mm in 1 meter (1/4 inch in 10 feet).



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- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.
 - D. Slope step treads at 2% (1/4 inch per foot) to drain.

3.3 REINFORCEMENT

- A. Locate, place and support reinforcement as specified in Division 3 sections, unless otherwise indicated.

3.4 CONCRETE PLACEMENT

- A. General: Comply with requirements of Division 3 sections for mixing and placing concrete, and as herein specified.
- B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
- D. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.



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- E. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
 - F. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.
 - G. Fabricated Bar Mats: Keep mats clean and free from excessive rust, and handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 50mm (2-inch) overlap to adjacent mats.
 - 1. Place concrete in 2 operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 2. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to the Contracting Officer's Representative.
 - H. Curbs and Gutters: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results that meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.5 JOINTS

- A. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of



concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

- B. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.
- C. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:
 - 1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
 - 2. Sawed Joints: Form weakened-plane joints with powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
 - 3. Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.
- D. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints.
 - 1. Construct joints as shown or, if not shown, use standard metal keyway-section forms.
 - 2. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move.
- E. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.
 - 1. Locate expansion joints at 15 meters (50 feet) o.c. for each pavement lane unless otherwise indicated.



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- F. Extend joint fillers full width and depth of joint, not less than 12mm (1/2 inch) or more than 25mm (1 inch) below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
 - G. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
 - H. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
 - I. Fillers and Sealants: Comply with requirements of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

3.6 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with a 3 meter (10-foot) straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.
- C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 12mm (1/2-inch) radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:



1. Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to the Contracting Officer's Representative.
 - a. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.
 2. Burlap finish by dragging a seamless strip of damp burlap across concrete, perpendicular to line of traffic. Repeat operation to provide a gritty texture acceptable to the Contracting Officer's Representative.
- E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Contracting Officer's Representative.

3.7 CURING

- A. Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections. Use membrane-forming curing and sealing compound or approved moist-curing methods.
- B. Antispalling Treatment: Apply treatment to concrete surfaces no sooner than 28 days after placement, to clean, dry concrete free of oil, dirt, and other foreign material. Apply curing and sealing compound at a maximum coverage rate of 7.5 sq. meters per liter (300 s.f. per gallon). Apply antispalling compound in 2 sprayed applications. First application at rate of 9 sq. meters per liter (40 sq. yds. per gal.); second application, 14 sq. meters per liter (60 sq. yds. per gallon). Allow complete drying between applications.

3.8 REPAIRS AND PROTECTIONS



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- A. Repair or replace broken or defective concrete, as directed by the Contracting Officer's Representative.
 - B. Drill test cores where directed by the Contracting Officer's Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
 - C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
 - D. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just before final inspection.

END OF SECTION 02520

